Quality Designator: Beta

MISR maturity level definitions

This statement applies to MISR Level 2 TC Stereo, Albedo and Classifiers for December 03, 2001, and beyond until such a time as further improvements to MISR software are made. Quality statements covering earlier time periods may be accessed through links at the bottom of this page.

An extensive review of product quality has not yet been performed. Please read the summary words of caution if you have not done so already.

Many of the algorithms used in the product retrievals have been developed specifically for the MISR instrument, and as such, are relatively untested. We expect to improve on these algorithms as we gain experience with the data. Trade-offs with the stereo-matching algorithms have been made at times to sacrifice accuracy or coverage for speed and vice-versa.

In spite of all the warnings, the MISR Level 2 TC Stereo, Albedo and Classifiers software which generated these products is believed to be functioning quite well except where noted below. This statement highlights major known problems with the products, as well as functionalities which are currently not implemented.

The Restrictive and Expansive albedos are still not ready for public release and thus have been set to NoRetrieval throughout the swath. Clear-Sky Modeling for the Local Albedo has not yet been implemented, nor have the Grey-Level Difference Vectors.

The Angular Signature Cloud Mask algorithm has not been implemented. So, all of the ASCM fields (both the cloud mask and the corresponding cloud fractions) contain "NoRetrieval" values in the Cloud Classifiers product.

L2TC Stereo (a.k.a. TC_STEREO) (from MISR PGE8a)

REGISTRATION
Cloud motion calculations are quite sensitive to the quality of registration of the D camera L1B2 ellipsoid-projected radiance products. Since Level 1 does not yet utilize Reference Orbit Imagery (ROI) when performing registration correction, the registration relies on a fairly static camera model. The camera model changes periodically, and although the registration is typically much better, the camera models in use only guarantee accuracy of 2 pixels or less in the D cameras. Cloud height accuracy is nominally 562 m, corresponding to 1 pixel of accuracy in the A cameras. Under the best of conditions, the heights often appear quantized. Further, they are occasionally made worse due to errors in cloud motion caused by misregistration of the D cameras. A 2 pixel D camera error translates to a 10-15 m/s error in the cloud motion vectors, which propagates to an error of 1100 m in height. We expect the registration reliability to improve significantly when the ROI is used, and we anticipate a reduction in height and wind uncertainties of approximately a factor of 2. For more details, including a link to a list of orbits with known registration problems, see the Georectification Page.

DOMAIN ARTIFACTS
Cloud motion retrievals are made on 70.4 km domains. This may at times result in discontinuities at domain boundaries for cloud heights.

STRIPES
Horizontal stripes may occasionally appear in the product for some parameters. This is due to one or more missing lines of data in Level 1, and often shows up in Level 2 parameters as "No Retrieval" flag values. For more details, see EXCEPTIONS/ANOMALIES in the Level 1 Quality Statement.

BLUNDERS
Blunder detection has not been implemented. As a result, spikes may occasionally appear in the cloud heights.

ALGORITHM UPDATES
The cloud motion and height retrievals have changed somewhat from the Level 2 Cloud Detection and Classification ATB (JPL D-11399, Rev. D). These changes will be reflected in the next release of the document, Rev E. Highlights include:

- The histogramming of the cloud motion for each domain now involves the identification of clusters of points which may cross the histogram bin boundaries, resulting in a matrix which identifies the clusters. The clusters chosen for the two cloud layers must be local maxima in this matrix. The histogram now includes a center bin which is centered on 0.0 in each direction. We no longer concatenate bins with the same population together but rather choose the one with the smallest height range.

- External meteorological inputs such as MODIS and NSIDC are not yet used. Instead, a static monthly climatology (the TASC dataset) is used.

- The Level 1 Radiometric Camera-by-camera Cloud Mask (RCCM) still has not been successfully validated over land, but is working well over ocean. Therefore, the Stereoscopically Derived Cloud Mask relies solely on stereoscopically matched data to determine the presence over land, but does include the Level 1 Radiometric data as input over ocean.

- If there is no successful stereo retrievals for a given 1.1km subregion, the stereoscopic height for that region is set to NoRetrieval except under the following circumstances: if the pixel is located over ocean and the RCCM indicates ClearHighConfidence, the surface height at that point is substituted in for the final stereo height.

- When calculating the Reflecting Level Reference Altitude (RLRA) at 2.2km resolution, it is set to NoRetrieval if all of the corresponding StereoHeights are also NoRetrieval.

L2TC Albedo (a.k.a. TC_ALBEDO) (from MISR PGE8c)

RLRA DISCONTINUITIES
The process of registering the BRF's from the surface ellipsoid to the Reflecting Level Reference Altitude (RLRA) is dependent on the quality of the incoming RLRA. If the RLRA is discontinuous due to blunders in the stereoscopic height retrieval, this will feed through to the Top-of-Column BRF's and the Local Albedo and show up as discontinuous values in those products. If there was no valid stereoscopic height retrieval anywhere within a 2.2 km region (the resolution of the RLRA), the RLRA (and consequently the reprojected BRF's, the number of un-obscured pixels and the Local Albedos) will all be set to NoRetrieval.

MODEL DIFFERENCES
The Local Albedo calculation is first attempted by Deterministic Modeling (if the scene is homogenous), then Stochastic Modeling and finally solid-angle weighting. No modeling is attempted for clear-sky pixels or where the solar zenith angle is < 25.8 degrees. The (Deterministic - Stochastic) model difference is peaked at 0.0, with the bulk of the differences being less than 0.02 with no appreciable bias. The peak of the (Deterministic-SolidAngle) difference distribution is also located at 0.0, but the SolidAngle albedos are biased consistently higher than the Deterministic ones, with differences up to 0.08. There is some slight band-to-band variation present in the model-difference distributions, but the shapes and peak locations of the distributions are similar.

BAND DIFFERENCES
The Local Albedo of the Red, Green and NIR bands are all very similar, with differences between them on the order of 1% or less. For low clouds, the Blue band can be up to 5% higher than the Red due to the increased Rayleigh scattering above the cloud-tops. This difference decreases as the cloud-top height increases.

L2TC Classifiers (a.k.a. TC_CLASSIFIERS) (from MISR PGE8b)

ASCM NOT AVAILABLE
The Angular Signature Cloud Mask algorithm has not been implemented. So, all of the ASCM fields contain "NoRetrieval" values in the Cloud Classifiers product.

CLOUD CLASSIFIERS FIELDS
The Cloud Classifiers contain the altitude-binned cloud fractions for each of the three MISR cloud masks, SDCM, RCCM and eventually ASCM. The four possible mask values for the cloud fractions are: CloudHighConfidence, ClearHighConfidence, CloudHighConfidence (without the ASCM), and CloudLowConfidence (without the ASCM). The product also contains the angle-by-angle cloud fractions calculated from the RCCM. All these fields are calculated at 17.6km resolution.

Given that the algorithms for determining these classifiers are simple, the quality of these products is directly determined by that of the incoming data (the SDCM, the StereoHeights, the RCCM and eventually the ASCM). The reader is strongly urged to pay close attention to the quality statements for all these data.

Also see the:

- [Statement dated September 27, 2001](#) for MISR Level 2 Top-of-Atmosphere/Cloud Products from September 27 to December 03, 2001.
- [Statement dated March 30, 2001](#) for MISR Level 2 Top-of-Atmosphere/Cloud Products from March 30 to September 27, 2001.
- [Statement dated February 16, 2001](#) for MISR Level 2 Top-of-Atmosphere/Cloud Products from February 16 to March 30, 2001.